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Response to Khalaf et al. "Effect of a simulation of Am-241 deposition pattern in the leg bones on the detection efficiency of a high purity germanium detector"

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Disclaimer

Response to Khalaf et al. "Effect of a simulation of Am-241 deposition pattern in the leg bones on the detection efficiency of a high purity germanium detector"

Dear Editors,

Khalaf and colleagues compared MCNPX simulated measurement results for a homogeneous deposition and heterogeneous deposition of Am-241 in the skeletal components of the knee (2013). The authors modeled the right leg of USTUR case 0864, representative of a forty-year old skeletal deposition following chronic inhalation of an americium oxide, for the non-homogeneous deposition using results of the radiochemical analysis performed post mortem. A comparison of the detection efficiencies for the two deposition distributions lead the authors to conclude: "An assumption of a uniform distribution of ^{241}Am throughout the leg bones will simulate the ^{241}Am activity deposited in real bones of contaminated workers inadequately" (Khalaf 2013). This is an inappropriate and overreaching conclusion for research focusing on one person-specific deposition distribution. The deposition distribution within the skeleton following an intake is changing with time due to several factors (e.g., bone remodeling) and this report focused on one time, approximately forty years, after intake, which limits the scope of any conclusions that can be made from the data. Due to biological variability and intake-specific variables, such as material solubility, it would be inappropriate to apply such a specific heterogeneous distribution (like this one) to all workers. The authors didn't explicitly state that they would apply a specific heterogeneous distribution to all data, but it may be implied from such a conclusion. Since there is no way to determine the exact deposition distribution within the skeletons of living humans, assuming a homogenous deposition distribution for activity within the skeleton is a conservative approach for routine monitoring and especially for evaluating intake shortly after a potential exposure incident.

The author declares no conflict of interest.

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References

Khalaf M, Brey R, Kramer G, Capello K, Acha R. Effect of a simulation of Am-241 deposition pattern in the leg bones on the detection efficiency of a high purity germanium detector. Health Phys 105: 227-235; 2013.

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